The Design and Implementation of the Portable Wound Counter Used in the LLNL Whole Body Counting Facility.

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At the LLNL Whole Body Counter facility, we have designed a portable wound counter that can be deployed to any location outside our facility. This paper will explain the events that led up to the decision to purchase the counter, the factors that went into designing a portable system and some of the problems that we encountered.

Up until 1995, our facility operated with a fixed wound counter. This meant that anyone with a wound had to come to our facility. But in October of 1992, an incident occurred that changed how we operate. A person received a wound and was sent to our medical department as per proper procedures. Then the person had to come to our facility to see if the wound was contaminated. This was repeated until we could no longer find any contamination in the wound. We knew that the whole process could have been handled much more efficiently if we could have brought our wound counter to the medical facility and worked right along with the doctors. Fortunately, the wound was a small hand wound and the person was able to make the repeated trips back and forth. We were certain that some day this would not be the case and we would require a portable unit.

With our evaluation of our performance during the two incidents and the support of our Health Physics department, we were able to secure funding for a portable wound counter.
We chose to purchase a Bicron X-ray scintillation detector with a 2.5 cm diameter by 1 mm thick NaI(Tl) crystal. The crystal would allow us to most efficiently identify the low energy gammas from U, Pu, and Am. From past experience we knew that these were the elements that we would need to analyze most frequently.

The computer purchased was a Toshiba T4400SX/SXC notebook with OS2 WARP. We then installed Canberra's Genie PC software. Calibrations for

Am241, U238, Pu238 and Pu239 for 100% muscle tissue equivalent material and 50% muscle / 50% fat tissue equivalent material were performed. Wound count data can be analyzed on a paper form or placed into an EXCEL spreadsheet to calculate the MDA and wound activity. Data is backed up onto a diskette in the field and then onto a Jaz hard drive in the facility.

In 1995, another incident occurred which involved multiple wounds and, required us to take the wound counter to our medical department's decon facility. We needed to perform wound counts for several days at the medical facility. During this time, we realized that we needed more than just a wound counter; we needed a packaged system that would include detector support arms, check sources, etc. We started to create a "must have" list for the wound counter to make it more useful.

During the design of our portable wound counter package, a team of people from different disciplines came together and brainstormed ideas. Health Physicists told us what they would like us to analyze for, our mechanical technologist designed the case and the detector holder, our electronics technologist did some rewiring to fit it all in the case and the operators made sure it all worked right and was easy to use.

From all of the input, we designed a suitcase that holds the computer and the wound counter and a briefcase with all of the miscellaneous but essential items. These include the check source, the procedure for doing wound counts, lead sheets for shielding, worksheets, a calculator, log book, backup disks, plastic bags, towels, pens, etc. It also contains all of the necessary shipping forms to take the wound counter and the check source off site. We found that we needed a detector holder that would emulate a human wrist. The one that was designed has complete freedom of movement. We also noted that we needed to be able to extend the detector some distance from the computer. To do this, we lengthened the wires connecting the two and designed rods to extend the holder out over a patient on a gurney or table.

The suitcase weighs about 70 pounds and is transported on a luggage cart that folds out to three platform tabletops. We set up the cart with the suitcase and

computer on the top shelf, the detector on the second shelf and other components on the bottom shelf.

Since this system was designed, we have updated our 'wish list' of items for the package. One identified need is the hardware to attach the detector arm to an IV pole. Another is to purchase additional detectors that can be used for other isotopes. As we deploy this system, we will continually be adding items to the list. For now, this system works reliably and is quick and easy to deploy.